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Title : High Body Energy Stores and Condition are linked with Diet Diversity in Juvenile Harbor Seals in Prince William Sound (PWS), Alaska: New Insights from Quantitative Fatty Acid Signature Analysis (QFASA)

Category : Ecology

Student : Not Applicable

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Abstract : Food limitation is among the hypothesized causes for the declines of various pinniped populations in the North Pacific, with juveniles identified as the age class most vulnerable to changes in prey availability. In PWS, harbor seal (*Phoca vitulina richardsi*) numbers have decreased by two-thirds since the early 1980's, only partly due to the 1989 Exxon Valdez oil spill. To test the food limitation hypothesis we measured body composition in newly weaned pups ($n=69$), yearling ($n=46$) and 2-3-year-old ($n=14$) harbor seals in late June 1997-2000 using isotope dilution. We obtained blubber biopsies and estimated non-pup diets using QFASA and a prey database of 26 species ($n=1151$). Pups were consistently heavy (29.4 ± 0.50 kg) and fat ($42.2 \pm 0.68\%$) compared to other harbor seal populations, with only minor interannual variation. Yearlings and 2-3-year olds, respectively, were also comparatively and consistently fat ($25.0 \pm 0.53\%$ and $23.0 \pm 0.87\%$). Diets of these juveniles were dominated by herring ($53.7 \pm 2.99\%$ and $46.2 \pm 3.79\%$), pollock ($15.0 \pm 1.66\%$ and $21.2 \pm 1.92\%$) and yellowfin sole ($18.3 \pm 1.49\%$ and $20.1 \pm 2.78\%$). Although high-fat (19%) eulachon averaged only 4.5% of diets, it contributed $>15\%$ to blubber signatures and thus fat stores. Minor prey species included sandlance, shrimp, various flatfish and cephalopods. Body fat content was not related to any single species level in the diet or to diet energy density, however, it was positively correlated with Levin's measure of diet diversity ($P < 0.001$, $r = 0.54$); diet diversity did not differ with year ($P = 0.536$). Our results suggest that lactating females were not nutritionally compromised, given the robust body condition of weaned pups. Additionally, juveniles with more diverse diets were in better condition independent of prey species eaten, provided that some high-quality prey were obtained to balance low-energy prey consumed. These data suggest that food limitation at this time of year or in these age classes was not a likely source of decline in this population.